UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/575,596	04/13/2006	Nengsheng Allan Zhang	L98000001	3821

32172 7590 09/15/2009
DICKSTEIN SHAPIRO LLP
1633 Broadway
NEW YORK, NY 10019

EXAMINER	
RAMOS, JAVIER J	

ART UNIT	PAPER NUMBER
2625	

MAIL DATE	DELIVERY MODE
09/15/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/575,596	ZHANG ET AL.	
	Examiner	Art Unit	
	JAVIER J. RAMOS	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23 and 26-42* is/are rejected.

7)☒ Claim(s) *24 and 25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 April 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-42 are pending in this application.

2. Claims 2-15, 17-29, 31-36 and 40-42 have been amended in a preliminary amendment [5/19/06].

Priority

3. Acknowledgment is made that this application is a national stage filing under 35 U.S.C. 371 of international application no. PCT/SG03/00245 filed on 10/13/03.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-4, 9-19, 26, 37 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takashi (JP 2000-351261 A) in view of Komai et al. (US 5,218,555).

5. A machine translation of Takashi (attached) was relied upon for the following rejections.

6. In regards to claims 1 and 37, Takashi teaches a method of calibrating a print engine **(Detailed Description (DD) [0009], [0018] and [0019], details a method for**

calibrating a printer) and an apparatus for calibrating a print engine **(Fig. 1 Object 101 and Fig. 2, Objects 20-27, detail the calibration apparatus)** based on a calibration chart having a first plurality of reference colours **(Fig. 1, shows the reference chart 102 with preexisting reference patterns 10a-10d; DD [0018]-[0019], reference patterns 10a-10d are used for comparison with test patterns to be printed by the device)** the method comprising the steps of i) printing a test sheet from the print engine; the test sheet having a second plurality of test colours thereon **(DD [0025] and [0026], the test patterns are printed in the blank regions of the reference chart 102 by color printer 101 creating the test chart 103)**, each test colour corresponding to a reference colour **(DD [0021]-[0024], each element of test patterns 13a-3d correspond to elements of reference patterns 10a-10d)**; and iv) adjusting the print engine in accordance with the difference to reduce the colour difference between each colour pair **(DD [0032]-[0036], an operator selects the best matching color pairs, lowest difference between reference and test colors, in order to adjust the output of the printing system)**, wherein the calibration chart includes openings formed therein, the openings corresponding to the positions of the second plurality of test colours **(DD [0022] and [0023], the blank regions 12a-12d of the reference chart correspond to the positions of the test patterns 13a-13d to be printed to form the test chart)**, and the method further comprises the step of: arranging the calibration chart on the test sheet prior to step (ii) **(DD [0025] and [0026], the test patterns are printed in the blank regions of the reference chart 102 by color printer 101**

creating the test chart 103 which is a combination of the reference colors and the test colors).

It is noted that Takashi does not specifically teach ii) digitising the reference and test colours; iii) calculating a colour difference between corresponding pairs of digitized reference and test colours.

In analogous art, Komai et al. (hereafter Komai) teaches ii) digitising the reference **(Col. 2, Line 67 to Col. 3, Line 7, the reference colors are digitally represented by L_0, a_0 and b_0)** and test colours **(Fig. 2, Step S6, tested color data in L, a, b is input into the system)**; iii) calculating a colour difference between corresponding pairs of digitized reference and test colours **(Fig. 2, Steps S7-S9 and S11, calculate color difference ΔL, Δa, Δb and ΔE; Col. 3, Lines 43-62, color difference between reference and tested pairs are determined)**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi by automatically determining color differences between digital representations of both reference and test colors utilizing fuzzy variables in aspects of the determination process, as taught by Komai, in order to judge color difference with excellent uniformity and credibility **(Komai: Col. 1, Lines 35-37)**.

7. In regards to claims 2 and 18, Takashi teaches each reference or test colour is formed from a combination of one or more colour components **(DD [0022] and [0023], the patterns are each created with a separate toner component from C, M, Y and K respectively)**.

8. In regards to claim 3, Takashi teaches each reference or test colour is formed from a combination of two or more colour components **(DD [0022] and [0023], the rectangular output color patterns are created utilizing the combination of color toner printed in different patterns (i.e. dithering) upon a medium to create gradation levels of a color, therefore the color toner and the color of the medium combined created the output color and therefore are the two color components to each output color)**.

9. In regards to claim 4, Komai teaches step (ii) further comprises the steps of: obtaining pixel information representing each digitised test **(Fig. 2, Step S6, tested color data in L, a, b is input into the system)** and/or reference colour **(Col. 2, Line 67 to Col. 3, Line 7, the reference colors are digitally represented by L_0, a_0 and b_0)**; and computing each colour component's intensity at each pixel **(Col. 2, Line 67 to Col. 3, Line 7 and Col. 3, Lines 43-50, the actual value of the corresponding L, a and b values for both the test and reference colors measured are the colors intensity)**.

10. In regards to claim 9, Takashi teaches the colour difference calculation is based on CMYK colour model **(DD [0022] and [0023], the reference and test patches are printed using the CMYK color space and therefore any calculations based on the reference and/or test patches will be based on the CMYK color model)**. Komai

teaches the color difference calculation as shown above in the rejection to claim 1.

11. In regards to claim 10, Komai teaches the colour difference calculation is based on RGB colour model **(Fig. 1, the camera 3 captures color information; Col. 2, Lines 46-66, the camera 3 inputs information into the CPU that then transforms this inputted information into CIE Lab values for further computations, the Examiner takes official notice that it is well known in the art for the output of a camera/scanner to be RGB information (device specific) that is then converted to CIE Lab or the like (device independent) in order to perform various calculations based off of the inputted color data)**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi by calculating a color difference based on a color model, as taught by Komai, in order to judge color difference with excellent uniformity and credibility **(Komai: Col. 1, Lines 35-37)**.

12. In regards to claim 11, Komai teaches the colour difference calculation is based on CIEL*A*B* **(Col. 3, Lines 42-55, the calculation of ΔE based on the difference of corresponding L, a and b values)**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi by calculating a color difference based on a color model, as taught by Komai, in order to judge color difference with excellent uniformity and credibility **(Komai: Col. 1, Lines 35-37)**.

13. In regards to claim 12, Takashi does not specifically teach that the adjusting step is based on fuzzy inference.

In analogous art, Komai teaches fuzzy inference used in judging a color difference between reference and test colors **(Col. 3, Lines 1-5 and Lines 30-63, the fuzzy inference is used to judge the color difference and to cause possible actions to be performed due to the difference)**.

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi by utilizing fuzzy inference in order to dictate whether or not a subsequent action should be taken (such as modifying the output colors), as taught in Komai, in order to more accurately judge color difference and therefore determine if action should be taken **(Komai: Col. 1, Lines 35-37; Fig. 2, output of S8, S9 and S11 decision section)**.

14. In regards to claim 13, Komai teaches the adjustment is automatic **(Col. 3, Lines 1-5 and Lines 30-63, the fuzzy inference is used to judge the color difference and to cause possible actions to be performed due to the difference automatically (such as an ending of the process as seen in the output of S8, S9 and S11 decision section in Fig. 2)**.

15. In regards to claims 14 and 26, Takashi teaches the step of verifying the print engine's output prior to the adjustment step (iv) **(DD [0032]-[0036], an operator selects**

the best matching color pairs, lowest difference between reference and test colors, before the adjustment of the output of the printing system).

16. In regards to claim 15, Takashi teaches the verification step provides a user interface to manually adjust the colour difference between corresponding pairs of test and reference colours **(DD [0032]-[0036], an operator selects the best matching color pairs, lowest difference between reference and test colors, in order to adjust the output of the printing system using a navigation panel 21)**.

17. In regards to claims 16 and 38, Takashi teaches a method of calibrating a print engine **(Detailed Description (DD) [0009], [0018] and [0019], details a method for calibrating a printer)** and an apparatus for calibrating a print engine **(Fig. 1 Object 101 and Fig. 2, Objects 20-27, detail the calibration apparatus)**, comprising the steps of: (i) capturing an image **(Abstract, creating the test chart 103 with the printer 101)** including a first plurality of reference colours **(Fig. 1, shows the reference chart 102 with preexisting reference patterns 10a-10d; DD [0018]-[0019], reference patterns 10a-10d are used for comparison with test patterns to be printed by the device)** and a second plurality of test colours printed by the print engine **(DD [0025] and [0026], the test patterns are printed in the blank regions of the reference chart 102 by color printer 101 creating the test chart 103)**, each test colour corresponding to a reference colour **(DD [0021]-[0024], each element of test patterns 13a-3d correspond to elements of reference patterns 10a-10d)**; and (v) adjusting the print

engine to reduce the colour difference between each colour pair **(DD [0032]-[0036], an operator selects the best matching color pairs, lowest difference between reference and test colors, in order to adjust the output of the printing system)**.

It is noted however that Takashi does not specifically teach (ii) digitising the reference and test colours; (iii) using fuzzy functions to calculate a difference in colour between corresponding pairs of digitised reference and test colours; (iv) defining the difference as a fuzzy value; and (v) adjusting the print engine based on the fuzzy value.

In analogous art, Komai teaches (ii) digitising the reference **(Col. 2, Line 67 to Col. 3, Line 7, the reference colors are digitally represented by L_0, a_0 and b_0)** and test colours **(Fig. 2, Step S6, tested color data in L, a, b is input into the system)**; (iii) using fuzzy functions to calculate a difference in colour between corresponding pairs of digitised reference and test colours **(Fig. 2, Steps S7-S9 and S11, calculate color difference ΔL, Δa, Δb and ΔE; Col. 3, Lines 30-65, color difference between reference and tested pairs are determined and are represented by the membership functions and the fuzzy inference)**; (iv) defining the difference as a fuzzy value **(Col. 3, Lines 30-65, the color difference between reference and tested pairs are determined and are represented by the membership functions and the fuzzy inference and therefore all of the variables used within the fuzzy determinations either in the membership function or the inference are fuzzy variables)**; and (v) adjusting the print engine based on the fuzzy value **(Komai: Col. 1, Lines 35-37; Fig. 2, output of S8, S9 and S11 decision section performs action on the print engine and therefore adjusts it)**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi by automatically determining color differences between digital representations of both reference and test colors utilizing fuzzy variables in aspects of the determination process, as taught by Komai, in order to judge color difference with excellent uniformity and credibility **(Komai: Col. 1, Lines 35-37)**. Further, it would be obvious to utilize fuzzy inference in order to dictate whether or not a subsequent action should be taken (such as modifying the output colors), as taught in Komai, in order to more accurately judge color difference and therefore determine if action should be taken **(Komai: Col. 1, Lines 35-37; Fig. 2, output of S8, S9 and S11 decision section)**.

18. In regards to claim 17, Takashi teaches the reference colours are provided on a calibration chart **(Fig. 1, shows the reference chart 102 with preexisting reference patterns 10a-10d; DD [0018]-[0019], reference patterns 10a-10d are used for comparison with test patterns to be printed by the device)** and the test colours are provided on a separate test sheet **(DD [0025] and [0026], the test patterns are printed in the blank regions of the reference chart 102 by color printer 101 creating the test chart 103)** prior to the image capture of step (i) **(Fig. 1, the reference pattern portion of the medium is considered a calibration chart and the blank portions of the medium are considered the test sheet so that the reference patterns and the test patterns are contained on separate portions of the medium)**.

19. In regards to claim 19, Komai teaches that step (ii) further comprises the steps of: obtaining pixel information from the digital image **(Fig. 2, Step S6, tested color data in L, a, b is input into the system and the reference colors are represented by L_0, a_0 and b_0)**; and computing density of each colour component at each pixel for each test and/or reference colour **(Col. 2, Line 67 to Col. 3, Line 7 and Col. 3, Lines 43-50, the actual value of the corresponding L, a and b values for both the test and reference colors measured are the color's density)**.

20. Claims 5-8 and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takashi (JP 2000-351261 A) in view of Komai et al. (US 5,218,555), as applied to claim 4, further in view of Kondo (US 2002/0036787 A1).

21. In regards to claim 5, Takashi, as modified by Komai et al. (hereafter Komai), teaches calculating the difference in intensity between corresponding pairs of test and reference colours **(Komai: Fig. 2, Steps S7-S9 and S11, calculate color difference ΔL, Δa, Δb and ΔE; Col. 3, Lines 43-62, color difference between reference and tested pairs are determined)**, the calculated difference being the amount of colour difference between the test and reference colours **(Komai: Fig. 2, Step S7-S9 and S11; Col. 3, Lines 42-55, the calculation of ΔE based on the difference of combined corresponding L, a and b values for the test and reference colors)**.

It is noted however that Takashi, as modified by Komai, does not specifically teach averaging the computed intensities to obtain a mean intensity of each colour

component for each test and reference colour and using the obtained intensities for subsequent calculations.

In analogous art, Kondo teaches averaging the computed intensities to obtain a mean intensity of each colour component for each test and reference colour and using the obtained intensities for subsequent calculations **(Fig. 9, the Mean Delta E designation between the target and proof colors; [0099]-[0103], the average difference for the mean values of intensity of both the target and proof colors is measured)**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi, as modified by Komai, by determining the average amount of difference between target and proof values over multiple samples and displaying graphically said difference, as taught by Kondo, in order to allow a user to determine the amount of consistency or inconsistency between target and proof color patches **(Kondo: [0106])**.

22. In regards to claim 6, Takashi, as modified by Komai, teaches that the colour difference is defined by a fuzzy variable **(Komai: Fig. 2, Steps S7-S9 and S11, difference calculation/decision steps; Figs. 4a-4d, the fuzzy variable is used to judge the type of color difference; Col. 3, Lines 30-63, the membership functions and fuzzy inference rules are used to determine type of color difference)**.

23. In regards to claim 7, Kondo teaches the fuzzy variable is represented by: $d_i = d(P_i^S, P_i^T) = \frac{1}{k} \times \sum_{x=1}^{k} d^x(P_i^S, P_i^T)$; where, d_i is the colour difference between ith pair of corresponding reference colour P_i^S and test colour P_i^T; k is the number of colour components; and d^x is the mean colour density difference between the ith pair of corresponding reference colour P_i^S and test colour P_i^T for x colour component **(Fig. 9, the Mean Delta E designation between the target and proof colors; [0099]-[0103], the average difference for the mean values of intensity of both the target and proof colors is measured, and therefore it is obvious to use an equation such as this in order to average the difference of two values over a set range of samples, averaging the Delta E over the entire Target and Proof range to get the Mean Delta E)**.

24. In regards to claim 8, Kondo teaches the step of calculating amount of noise present in each colour pair **(Fig. 9, the Delta E designation between the target and proof colors; [0099]-[0103], the noise can be considered the difference between the color pairs)**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi, as modified by Komai, by calculating noise present in color pairs, as taught by Kondo, in order to more accurately determine the amount of consistency or inconsistency between target and proof color patches **(Kondo: [0106])**.

25. In regards to claim 20, Takashi, as modified by Komai, teach the steps of: calculating the colour difference between corresponding pairs of test and reference colours based on respective densities **(Komai: Fig. 2, Steps S7-S9 and S11, calculate color difference ΔL, Δa, Δb and ΔE; Col. 3, Lines 43-62, color difference between reference and tested pairs are determined)**.

It is noted however that Takashi, as modified by Komai, does not specifically teach averaging the computed densities to obtain a mean density of each colour component for each test and reference colour or performing calculations based on the averaged densities.

In analogous art, Kondo teaches averaging the computed densities to obtain a mean density of each colour component for each test and reference colour or performing calculations based on the averaged densities **(Fig. 9, the Mean Delta E designation between the target and proof colors; [0099]-[0103], the average difference for the mean values of intensity of both the target and proof colors is measured)**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi, as modified by Komai, by determining the average amount of difference between target and proof values over multiple samples and displaying graphically said difference, as taught by Kondo, in order to allow a user to determine the amount of consistency or inconsistency between target and proof color patches **(Kondo: [0106])**.

26. In regards to claim 21, Takashi, as modified by Komai, teaches the colour difference is represented by a fuzzy variable **(Komai: Fig. 2, Steps S7-S9 and S11, difference calculation/decision steps; Figs. 4a-4d, the fuzzy variable is used to judge the type of color difference; Col. 3, Lines 30-63, the membership functions and fuzzy inference rules are used to determine type of color difference)**.

It is noted however that Takashi, as modified by Komai, does not specifically teach the variable d_i, defined as: $d_i = d(P_i^S, P_i^T) = \frac{1}{k} \times \sum_{x=1}^{k} d^x (P_i^S, P_i^T)$; where, k is the number of colour components; and d^x is the mean colour density difference between the ith pair of corresponding reference colour P_i^S and test colour P_i^T for x colour component.

In analogous art, Kondo teaches the variable d_i, defined as: $d_i = d(P_i^S, P_i^T) = \frac{1}{k} \times \sum_{x=1}^{k} d^x (P_i^S, P_i^T)$; where, k is the number of colour components; and d^x is the mean colour density difference between the ith pair of corresponding reference colour P_i^S and test colour P_i^T for x colour component **(Fig. 9, the Mean Delta E designation between the target and proof colors; [0099]-[0103], the average difference for the mean values of intensity of both the target and proof colors is measured, and therefore it is obvious to use an equation such as this in order to average the difference of two values over a set range of samples, averaging the Delta E over the entire Target and Proof range to get the Mean Delta E)**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi, as modified by Komai, by determining the average amount of difference between target and proof values over multiple samples utilizing, as taught by Kondo, in order to more accurately determine the amount of consistency or inconsistency between target and proof color patches for proofing operations **(Kondo: [0106])**.

27. In regards to claim 22, Kondo teaches the step of deriving colour channels containing one colour component based on d^x **(Fig. 9, the Lab color channels of both the target and the proof are based on at least a single component found in the difference between the target and proof densities as described in [0099]-[0103])**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi, as modified by Komai, by deriving color channels, as taught by Kondo, in order to utilize these values within a consistent/inconsistent determination between color patches for enhanced proofing performance **(Kondo: [0106])** .

28. In regards to claim 23, Kondo teaches the step of calculating a colour difference between colour channels **(Fig. 9, the Delta E designation between the target and proof colors; [0099]-[0103], the color difference is based on the difference between the Lab channels)**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi, as modified by Komai, by calculating color differences between channels, as taught by Kondo, in order to assist in the determination of consistency or inconsistency between target and proof color patches for proofing operations **(Kondo: [0106])**.

29. Claims 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takashi (JP 2000-351261 A) in view of Komai et al. (US 5,218,555), as applied to claim 16, further in view of Takeda et al. (US 2003/0210413 A1).

30. In regards to claim 27, Takashi, as modified by Komai et al. (hereafter Komai), does not specifically teach the step of: detecting the position of each digitized reference and test colour prior to the calculation step (iii). It is noted however that Takashi, as modified by Komai, teaches a medium containing both reference and test colors **(DD [0025] and [0026], the test chart 103 contains both a reference chart of reference colors and test colors filled into the blank areas of the reference chart)** and the calculation step (iii) **(see the rejection to claim 16 for calculation step (iii))**.

In analogous art, Takeda et al. (hereafter Takeda) teaches detecting the position of each colour prior to the calculation **(Figs. 7-9, show the process details specific to the patch position detection (Fig. 6, Object 275, patch position detection section) that occurs before the color density measurement and calculation (Fig. 6, Objects 276 and 277, density measurement and calculation sections) with respect to**

reference marks (Fig. 6, Objects 272 and 273, reference mark detection and comparison sections)).

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi, as modified by Komai, by detecting the position of color patches in relation to reference marks prior to color measurements and calculations, as taught by Takeda, in order to accurately measure the correct color information from the target color patches on the measured medium **(Takeda: [0015])**.

31. In regards to claim 28, Takashi, as modified by Komai, does not specifically teach the step of detecting reference marks in the captured image prior to the digitising step (ii).

In analogous art, Takeda teaches the step of detecting reference marks in the captured image prior to the digitising step (ii) **(Fig. 9, shows the reference mark position and comparison process before capturing of color patch density information; [0103], reference marks are detected)**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi, as modified by Komai, by detecting the position of color patches in relation to reference marks prior to color measurements and calculations, as taught by Takeda, in order to accurately measure the correct color information from the target color patches on the measured medium **(Takeda: [0015])**.

32. In regards to claim 29, Takeda teaches the step of comparing the position of the reference marks with default position values of the reference marks **([0103] and [0104], store a reference mark as a predetermined reference mark for use in comparison with other reference marks)**; calculating the difference **([0103] and [0104], the reference mark position data comparison section 273 is used to determine the difference in position of marks)**; and locating the positions of each reference and test colour in the captured image to perform the digitisation step **([0108], the patch position detection section 275 detects the location of patches to be measured relative to the location of the nearest reference mark)**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Takashi, as modified by Komai, by detecting the position of color patches in relation to reference marks prior to color measurements and calculations, as taught by Takeda, in order to accurately measure the correct color information from the target color patches on the measured medium **(Takeda: [0015])**.

33. **Claims 30-36 and 39-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komai et al. (US 5,218,555) in view of Takashi (JP 2000-351261 A) and Kondo (US 2002/0036787 A1).**

34. In regards to claims 30 and 39, Komai et al. (hereafter Komai) teaches a method of deriving an adjustment value for a print engine **(Fig. 2)** and an apparatus for deriving an adjustment value for a print engine **(Fig. 1, shows an apparatus consisting of**

objects 2-9), the method comprising the steps of: (i) capturing an image **(Col. 2, Lines 46-53, color information is captured by the cameras; Fig. 2, Step S6, tested color data in L, a, b is input into the system)**; (ii) digitising the reference **(Col. 2, Line 67 to Col. 3, Line 7, the reference colors are digitally represented by L_0, a_0 and b_0)** and test colours **(Fig. 2, Step S6, tested color data in L, a, b is input into the system)**; (iii) calculating a difference in colour between corresponding pairs of digitized reference and test colours **(Fig. 2, Steps S7-S9 and S11, calculate color difference ΔL, Δa, Δb and ΔE; Col. 3, Lines 43-62, color difference between reference and tested pairs are determined)**.

It is noted however that Komai does not specifically teach an image including a first plurality of reference colours and a second plurality of test colours printed by the print engine, each test colour corresponding to a reference colour.

In analogous art, Takashi teaches an image including a first plurality of reference colours **(Fig. 1, shows the reference chart 102 with preexisting reference patterns 10a-10d; DD [0018]-[0019], reference patterns 10a-10d are used for comparison with test patterns to be printed by the device)** and a second plurality of test colours printed by the print engine **(DD [0025] and [0026], the test patterns are printed in the blank regions of the reference chart 102 by color printer 101 creating the test chart 103)**, each test colour corresponding to a reference colour **(DD [0021]-[0024], each element of test patterns 13a-3d correspond to elements of reference patterns 10a-10d)**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Komai by utilizing an image with both reference and test colors contained thereon, as taught by Takashi, in order to reduce the trouble and labor related to calibrating test patterns **(Takashi: Abstract)**.

Further, Komai, as modified by Takashi, does not specifically teach (iv) providing the calculated colour difference for verification.

In analogous art, Kondo teaches (iv) providing the calculated colour difference for verification **(Fig. 9, the delta E values are displayed)**.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify Komai, as modified by Takashi, by determining the average amount of difference between target and proof values over multiple samples and displaying graphically said difference, as taught by Kondo, in order to allow a user to determine the amount of consistency or inconsistency between target and proof color patches **(Kondo: [0106])**.

35. In regards to claim 31, Kondo teaches that step (iv) further comprises the step of displaying the colour difference **(Fig. 9, the delta E values are displayed)**.

36. In regards to claim 32, Kondo teaches that the colour difference is displayed in graphical form **(Fig. 9, the delta E values are displayed in graphical form in object 920)**.

37. In regards to claim 33, Komai teaches the step of adjusting the print engine based on the calculated difference **(Col. 3, Lines 1-5 and Lines 30-63, the fuzzy inference is used to judge the color difference and to cause possible actions to be performed due to the difference)**.

It is noted however that Komai does not specifically teach adjusting the print engine to reduce the colour difference between each color pair.

In analogous art, Takashi teaches adjusting the print engine to reduce the colour difference between each color pair **(DD [0032]-[0036], an operator selects the best matching color pairs, lowest difference between reference and test colors, in order to adjust the output of the printing system)**

38. In regards to claim 34, Takashi teaches the adjustment step is performed before step (iv) **(DD [0032]-[0036], an operator decides when to adjust the colors, further if the colors are adjusted and then the process is run again, the colors will have been adjusted before the color difference is again provided)**.

39. In regards to claim 35, Takashi teaches the adjustment step is performed after step (iv) **(DD [0032]-[0036], an operator decides to adjust the colors of the system in response to a calculated difference)**.

40. In regards to claim 36, Takashi teaches printing a test sheet including the plurality of test colours from the adjusted print engine **(DD [0025] and [0026], the test**

patterns are printed in the blank regions of the reference chart 102 by color printer 101 creating the test chart 103 which is a combination of the reference colors and the test colors); and visually comparing the test colours against a plurality of reference colours provided on a calibration chart **(DD [0032]-[0036], an operator selects the best matching color pairs, lowest difference between reference and test colors, in order to adjust the output of the printing system using a navigation panel 21)**.

41. In regards to claim 40, Takashi teaches a display **(DD [0040], navigation panel 21)**.

42. In regards to claim 41, please see the rejection to claim 15 above.

43. In regards to claim 42, Takashi teaches input devices to control the control means **(DD [0032]-[0036], navigation panel 21)**.

Allowable Subject Matter

44. Claims 24 and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The limitation of the method according to claim 23, wherein the colour channel

difference is defined as a fuzzy variable, fd_i, where

$fd_i = fd(P_i^S, P_i^T) = \frac{1}{m} \times \sum_{x\_is\_a\_filtered\_channel} fd^x(P_i^S, P_i^T)$ where m is the number of filtered colour channels; and fd^x is the mean colour density difference between the ith pair of corresponding reference colour P_i^S and test colour P_i^T for x colour component which is a filtered colour channel is not either stated in any of the stated prior art either singularly, or in combination. Therefore, the above claim limitation is allowable over the current art of record. Further, claim 25 is indicated as allowable due at least to its dependence upon claim 24.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAVIER J. RAMOS whose telephone number is (571) 270-3947. The examiner can normally be reached on Monday to Thursday - 9 am to 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark K. Zimmerman can be reached on (571) 272-7653. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Javier J Ramos/
Examiner, Art Unit 2625

/Mark K Zimmerman/
Supervisory Patent Examiner, Art Unit 2625